

FORM PTO-1390 (Modified)  
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

## TRANSMITTAL LETTER TO THE UNITED STATES

DESIGNATED/ELECTED OFFICE (DO/EO/US)

CONCERNING A FILING UNDER 35 U.S.C. 371

990351

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/485750

INTERNATIONAL APPLICATION NO.

PCT/DE98/01180

INTERNATIONAL FILING DATE

24 April 1998

PRIORITY DATE CLAIMED

12 August 1997

## TITLE OF INVENTION

Security Element for Documents, Devices for Controlling Documents Comprising such Security Elements,  
and Method of Using said Elements and Devices

APPLICANT(S) FOR DO/EO/US

Puttkammer

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

## Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

- a.) an English Translation of the Specification and Claims Amended under Rule 66 PCT;
- b.) a Post Card Receipt

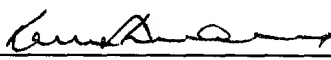
U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.492 (a)(1) - (5)) <b>09,485,730</b>		INTERNATIONAL APPLICATION NO. <b>PCT/DE98/01180</b>		ATTORNEY'S DOCKET NUMBER <b>990351</b>	
21. The following fees are submitted: <b>BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5)) :</b> <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$970.00</b> <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$840.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$690.00</b> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$670.00</b> <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$96.00</b> <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				CALCULATIONS PTO USE ONLY	
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				# <b>\$0.00</b>	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	18 - 20 =	0	x \$18.00	#	\$0.00
Independent claims	# 3 - 3 =	0	x \$78.00	#	\$0.00
Multiple Dependent Claims (check if applicable). <input type="checkbox"/>				#	\$0.00
<b>TOTAL OF ABOVE CALCULATIONS =</b>				#	\$840.00
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). <input checked="" type="checkbox"/>				#	\$420.00
<b>SUBTOTAL =</b>				#	\$420.00
Processing fee of <b>\$130.00</b> for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				#	\$0.00
<b>TOTAL NATIONAL FEE =</b>				#	\$420.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input checked="" type="checkbox"/>				#	\$40.00
<b>TOTAL FEES ENCLOSED =</b>				#	\$460.00
				Amount to be: refunded	\$
				charged	\$

- ☒ A check in the amount of **\$460.00** to cover the above fees is enclosed.
- ☐ Please charge my Deposit Account No. 513R# in the amount of # to cover the above fees.  
A duplicate copy of this sheet is enclosed.
- ☐ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. # A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:

Law Offices of Karl Hormann  
86 Sparks Street  
Cambridge, MA 02138-2216

  
SIGNATURE

**Karl Hormann**  
NAME

**26,470**  
REGISTRATION NUMBER

**14 February 2000**  
DATE

International Application No.: PCT/DE98/01180  
International Filing Date: 24 April 1998  
Priority Application: DE 197 34 855  
Priority Filing Date: 12 August 1997  
2. Priority Application: DE 198 12 811  
2. Priority Filing Date: 15 March 1998  
Inventor: Puttkammer, Frank  
For: Structure of a Security Element...

86 Sparks Street  
Cambridge, MA 02138-2216  
14 February 2000

Hon.  
Assistant Commissioner for Patents  
Washington, DC 20231

**Box PCT**

**Amendment Prior to Claims Fee Calculation**

Sir:

With a view to avoiding claims surcharges otherwise due, Applicant  
courteously requests entry of the following amendment into the claims  
amended under Rule 66 PCT on 14 July 1999:

Claim 3, line 1: change "one or more of the preceding claims" and substitute  
--claim 1-- therefor;

claim 4, line 1: change "one or more of the preceding claims" and substitute  
--claim 1-- therefor;

claim 5, line 1: change "one or more of the preceding claims" and substitute  
--claim 1-- therefor;

claim 6, line 1: change "one or more of the preceding claims" and substitute  
--claim 1-- therefor;

claim 10, line 1: delete "or 9";

claim 11, line 1: change "one or more of claims 8 to 10" to --claim 8--;

claim 12, line 1: change "one or more of claims 8 to 11" to --claim 8--;

claim 13, line 1: change "one or more of claims 8 to 12" to --claim 8--;

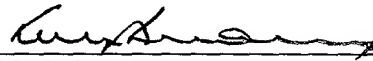
claim 14, line 1: change "one or more of the preceding claims 8 to 13" to  
--claim 8--;

claim 15, line 1: change "one or more of the preceding claims 8 to 14" to --claim 8--;

claim 16, line 1: change "one or more of claims 8 to 14" to --claim 8--; and

claim 17, line 1: change "one or more of claims 8 to 16" to --claim 8--.

Respectfully submitted,



Karl Hormann

Registration No.: 26,470

Area Code (617)-491-8867

004420" 05/24/60

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(f) AND 1.27 (c)) - SMALL BUSINESS CONCERN**

Docket No.  
990351

Serial No.

Filing Date

Patent No.

Issue Date

Applicant/ **PUTTKAMMER, Frank**  
Patentee:

Invention: **Security Element Structure for Documents, Devices for Controlling Documents Comprising such  
Security Elements, and Method of Using said Security Elements and Devices**

I hereby declare that I am:

- ☐ the owner of the small business concern identified below:
- ☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: **WHD elektronische Prueftechnik GmbH.**ADDRESS OF CONCERN: **Industriestrasse 19, D-01129 Dresden, Germany**

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above identified invention described in:

- ☒ the specification filed herewith with title as listed above.
- ☐ the application identified above.
- ☐ the patent identified above.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ no such person, concern or organization exists.  
☐ each such person, concern or organization is listed below.

FULL NAME  
ADDRESS

☐ Individual

☐ Small Business Concern

☐ Nonprofit Organization

FULL NAME  
ADDRESS

☐ Individual

☐ Small Business Concern

☐ Nonprofit Organization

FULL NAME  
ADDRESS

☐ Individual

☐ Small Business Concern

☐ Nonprofit Organization

FULL NAME  
ADDRESS

☐ Individual

☐ Small Business Concern

☐ Nonprofit Organization

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING:

Gert Flege, Managing director

TITLE OF PERSON SIGNING

OTHER THAN OWNER:

ADDRESS OF PERSON SIGNING:



elektronische Prüftechnik GmbH  
Industriestraße 19 • D - 01129 Dresden  
Tel. (03 51) 8 49 15 56 • Fax (03 51) 8 49 15 96

SIGNATURE: x

Pat Vley

DATE:

10.02.2000

10 February 2000

5/PRTS

**Structure of Security Elements for Documents and Apparatus  
for Examining Documents Provided with Such Security Elements  
as well as Method of Using such Security Elements and Apparatus.**

5

The invention relates to the structure of security elements for documents and apparatus for examining documents provided with such security elements as well as a method of using these security elements and apparatus.

10

Hitherto, documents provided with optically effective diffraction security elements are examined by complex optical examining technology. It is not possible to examine documents provided with optically effective diffraction security elements or with so-called OVD's (optically variable devices) in a document processing machine because of its high processing speed. For instance, U.S. patent 4,255,652 describes an apparatus for detecting characterizing indicia in documents provided with electrically conductive areas. A charge is transmitted to one of the electrically conductive areas by means of a first capacitive element extending across the width of, and arranged above, the document to be examined. During further transport of the document to be examined, the charged electrically conductive area moves below a second capacitive element extending across the width of the document to be examined. The charge is dissipated by the second element and an evaluation and decoding circuit generates a typical signal function.

The apparatus and the operational principle applied are based upon relatively large electrically conductive areas which extend over the width of the document to be examined, for the size of the transported charge diminishes strongly in smaller surfaces. A simultaneous examination of several areas is as impossible as it is to define their geometric shape and size, particularly in designs of delicate members.

Furthermore, European patent EP 0,097,570 proposes an apparatus for examining the dielectric properties of sheet-like materials in which the

material to be examined is moved through contact pairs of an array of capacitors of predetermined configuration. A change in the dielectric properties causes a change in the voltage at the receiving electrodes. The signals are individually amplified and evaluated.

5           In this apparatus which is based upon examining the dielectric properties of the sheet material, more particularly of water marks, all capacitors are simultaneously energized by the frequency of an oscillator which may lead to a coupling between adjacent channels. If one chooses a larger distance between the capacitors in order to avoid this defect, the  
10   attainable geometric resolution is reduced. Hence, coarse structures only can be detected. To control the problem of transient oscillations at the receiving electrodes of the capacitors only a relatively low switching frequency is permissible which limits the speed at which the examinations can be carried out. For structural reasons, too, such an apparatus cannot be used in high  
15   speed processing machines.

          German patent DE 27 47 156 describes a method and a testing device for examining the genuineness of identity cards secured by holograms. The OVD is reproduced and is thereafter subjected to a visual control. This method is not suited for a high-speed, efficient examination independent of a  
20   person.

          European patent EP 0,042,946 describes an apparatus for generating scanning patterns which are examined by a laser, mirror and lens system as well as by a photodetector. In this case, too, the economic complexity is very high. It would increase even further where the material to be examined were  
25   to be examined without prior sorting. In order to avoid pre-sorting either a multiple arrangement of the system for examining the genuineness or repeated examinations would be necessary.

          European patent EP 0,092,691 A1 describes an apparatus for detecting security strips in banknotes. The material-specific absorption bands  
30   of a plastic security strip are measured by means of two penetrating light channels operating in the infrared range at wavelengths of about 5 mm. An examination of the genuineness and quality of optically effective diffraction



security elements has neither been described in the mentioned European patent, nor would it be possible with the described apparatus.

A light reflection examination of banknotes by means of a line scan camera is known from British patent GB 21 60 644 A, and from Swiss patent  
5 CH 652,355 it is known to examine cards of a specific layer structure by reflective or penetrating light. In both cases, the examination is one in which image data are compared with originals. The reflections and traces of use which occur in the two methods are problematic and, hence, a great disadvantage.

- 10 German laid-open patent specification 38 11 905 describes an automatic examination for the genuineness of holographic data. For examining a hologram by penetrating light, the arrangement described in the laid-open specification provides for disposing transmitter and receiver directly opposite each other in order to be able to analyze the data of the hologram.  
15 Because of direct exposure to light in the intervals between consecutive banknotes, this opposite arrangement of transmitter and receiver leads to overriding which is disadvantageous in terms of the measuring operation and in certain circumstances to damage of the receiving elements. When examining used banknotes, creases therein render an examination practically  
20 impossible because of random reflections.

In accordance with the known methods described *supra* it is necessary precisely to position the objects to be examined, and all of the apparatus are unsuitable for high speed processing machines.

- German patent specification 196 04 856 A1 proposes to carry out the  
25 examination of optical security characteristics of such metallically reflective layers as kinegrams, holograms and the like on securities, in particular banknotes, for their condition, quality or acceptability such that a metallically reflective safety element of the document is scanned in a manner known per se by penetrating light by at least one electronic camera, preferably a CCD  
30 line scanning camera and to compare the actual values thus detected against desired values by known image evaluation processes in order to mark banknotes with defective safety characteristics or to separate defective

09485750 021400  
004720 05253460

banknote in a sorting apparatus. As described in German patent specification DE 196 04 856 A1, the apparatus is characterized by a transport device known per se for moving the securities in the range of the electronic camera, an infrared radiation source at that side of the security to be examined which  
5 faces away from the camera and by the fact that the optical axis of the camera and the optical axis of the illumination device enclose an angle deviating from 180°, and that the transport device is preferably made up of transport belts which are separated from each other transversely to the transport direction. This apparatus or method also suffers from the  
10 disadvantage that especially used banknotes with creases, or banknotes with a kinegram foil which is damaged or the surface of which is soiled, will not be recognized as genuine banknotes. Moreover, while the described method and the related apparatus are automated they are unsuitable for the high speed banknote machines in today's market which have a through-put of  
15 1,200 pieces per minute.

At present, optically effective diffraction security characteristics or OVD's on such securities as, for instance, German 100 and 200 mark banknotes are manually or visually examined for damage, acceptability, precise formation of their margin, and so forth. The examination is carried out  
20 visually during production of the banknotes as well as when it may be necessary to separate circulating banknotes. These methods are time-consuming and expensive. Moreover, the examination is not accurate since in the case of optically effective diffraction security elements their demetallized zones have so far been fabricated by chemical etching  
25 processes. As is well known, such processes do not permit an exact contour of the desired structures. As a rule, "frayed" contours result. As is known from U.S. patents 5,248,544 as well as 5,388,862 optically variable security elements for documents such as so-called holograms or safety threads are provided with layers of metal layers for reflection in holograms. Optically  
30 effective diffraction security elements or OVD's are used only to achieve optical effects and may be examined only by optical test methods or by visual inspection. Other methods of examination, especially for high speed

processing machines, are not known.

In German patent specification 195 42 995 A1 there is described, among others, a method of examining the genuineness of a data support by adjustment of the various available data. In accordance with this patent the

5 following possibilities exist:

- Comparing the standard image of the hologram with the image of the memory unit;

- Comparing the data of the hologram with the data in a defined area of the data support and/or those in a memory;

10 - Comparing the date of the hologram with those data which are available from an input unit;

- Comparing the individual image of the hologram with data from the input unit, the memory and/or the data of the defined area.

15 This method, too, is time-consuming and expensive. Optically, the examination is performed by balancing by way of image recognition by means of a reading device, and, therefore, it is unsuited for high speed processing or examination machines.

20 The various characteristics to be examined, examination zones and structures as well as the examination methods and apparatus for testing the genuineness of objects, securities, especially banknotes, suffer from the major disadvantage which is inherent in the fact that they are known. That is to say, they are known to an extent which make it possible for a counterfeiter on the basis of the examination methods and apparatus and their function to draw conclusions in respect of the characteristics to be examined, the

25 examination zones and structures. From this, it is necessary to derive a completely new definition of a task in respect of the examination of objects, securities , especially banknotes, the accomplishment of which must be precipitated in a novel method of utilizing the examination characteristics, examination methods and apparatus in order to prevent data codes from

30 being discovered and copied.

The task of the invention resides in eliminating the disadvantages of

the prior art and, especially, to complete the structure of security elements for documents with further security elements and to propose apparatus for examining such security elements and a novel method of using security elements and apparatus which make it substantially more complicated, if not impossible, from the functioning of examination methods and apparatus to make conclusions in respect of the security elements in order to produce counterfeits so similar to their originals that they cannot be detected by the examining apparatus.

A further task of the invention is to propose optically effective diffraction security elements and characteristics or OVD's which may be accurately examined quickly, independently of personal assistance and with little effort. The related apparatus for examining security characteristics are to be used in high speed document processing machines as well as in hand-held examination devices. Furthermore is it a task of the invention to fashion a plurality of the devices in accordance with the invention in such a manner that they examine a defined number of several security elements or characteristics provided on a document with the number of security elements differing between the devices. The purpose of this task is to provide different examination techniques in keeping with the possible expense and the security elements which can be examined.

The task is accomplished by the following description of the invention.

The structure of security elements with a metallic reflection layer for documents to be examined does not aim, *prima facie*, at visual inspection but at a design aiming at a method of examination. This design - hereinafter referred to as functional design - is the combination of electrically conductive and insulated structures of identical or differing size in identical or different planes with identical or differing conductivities and is fabricated from metallized structures and/or conductive inks or printing dyes. In its variegation and different constitutions, the functional design contains coding functions in all distinguishable security elements and, hence, is capable of

encrypted examination. In accordance with the invention the functional design may be an optically effective diffraction security element, or it may consist of conductive dyes or inks. Structured as an optically effective diffraction element, it may conform to the optically, i.e. visually perceptible design, or it may even assist it in its optical design.

Structures of metallizations and electrically conductive dyes and inks such as lines, dots and figures which may be examined by capacitive coupling are labeled security element. Such security elements are arranged on documents singly or in combinations.

A security characteristic consists of at least one security element and preferably of a compilation of identical or differing arrangements, size, hues and/or conductivity.

Optically effective diffraction security elements are fabricated from metallized structures rather than demetallization of individual structures as heretofore, by using known fabrication technologies. In order to fabricate the security elements to be examined in high quality, metallized security elements are fabricated in accordance with the invention with a very high approximation of the desired metallic structure and steep edges to adjacent insulating structures. The steepness of these edges makes it possible to fabricate and examine micro-structures. As has already been mentioned *supra*, the demetallized zones of optically effective diffraction security elements have hitherto been fabricated by chemical etching processes. As is known, such processes do not make it possible to make steep edges and exact contours of desired structures. As a rule, "frayed" marginal contours are created. Such marginal contours do not permit the use as functional design of demetallizations of widths in the range of a tenth of a millimeter. To obtain exact marginal contours for a functional design, it is necessary to apply a different fabrication technology. A target-oriented metallization with adjacent non-metallized zones is carried out in known super vacuum vaporizing equipment. For counterfeiters, these means an increased expense for the production of counterfeits. Aside from known more or less full-surface areas,

the optically effective diffraction security elements are provided in their examination zones with at least one security element shaped as beams, grids, bows and/or circles of a line width  $\leq 5$  mm. At the same time, these security elements constitute an encryption of data which are recognized and  
5 evaluated by means of the apparatus in accordance with the invention.

The apparatus for examining the security elements in accordance with the invention is provided with a capacitively operating scanner. This scanner consists of a plurality of transmitting electrodes disposed adjacent each other in one or more rows and a receiving electrode disposed parallel to the array.

10 Compared to sensors with large-surface electrodes, the scanner with insignificant electrode surfaces offers the advantage of resulting lower capacitive coupling between individual electrodes. In a document processing machine, the scanner is arranged so that optical or mechanical sensors present in common document processing machines activate the examining  
15 device of the present invention. To reduce errors of detection and measurement, a sensor support is preferably utilized which mounts all sensors necessary for the examination. The spacings between sensors are minimized. Minimizing the spacings between the sensors is necessary for reducing the change in position of the documents to be examined, since  
20 during movement of the document its position changes as a result of its condition, the degree of wear of the machine as well as ambient conditions, especially temperature and humidity. The distance between document changes as a result of imprecise insertion of the documents. An oblique movement of documents may be the result of worn transport rollers and  
25 bearings, implying that a document just inserted will rotate during transport. This undesirable change in position leads to interference with a defined time sequence which, in turn, causes false rejections. The smaller the security elements the more problematic is their detection. The apparatus in  
30 accordance with the invention is provided with a biasing device which constitutes a very small resistance for the document. This biasing device guides the document in parallel relative to the transmitting and receiving electrodes or preferably biases the document against the scanner.

Furthermore, the shafts of the transport rollers are connected to a mass by means of sliding contacts. The additional screens and the biasing device ensure repeatable examination conditions including a uniform distance or contact between documents, and the functionality of the sensor is improved.

5 Activation of individual transmitting electrodes by electrical energy takes place sequentially by an electronic energizing circuit of a switching frequency in the kHz range and above. Aside from a current source, the main components of the electronic energizing circuit are a multiplexer, an oscillator for providing energy for the transmitting electrodes and an oscillator for energizing the  
10 multiplexer.

In the presence of electrical conductivity the energy of any energized transmitting electrode is capacitively coupled to the receiving electrode. The signal pattern at the receiving electrode is converted into a corresponding signal image. The signal image depends upon the metallized structure of the  
15 optically effective diffraction security element. An electronic evaluation circuit at the output of the receiving electrode compares the signal image of the test document to appropriate reference signals. The electronic evaluation circuit in essence consists of a current source, an amplifier, a demodulator, a comparator, a micro-processor with a memory and filters for the suppression  
20 of extraneous and interference signals.

In addition to the software for the micro-processor there are stored in the memory reference signal images which in dependency of the security elements to be examined are compared to the scanned signal image of the test document. Since the scanner exceeds the entire width of the document  
25 every electrically conductive security element will be detected by the apparatus in accordance with the invention. The comparison with the reference signal images delivers a classifying signal for further processing. Accordingly, a document identify as counterfeit, for instance, could be sorted out by stopping the test device or by diverting the transport path of the  
30 document. In order to reduce interferences the sensor support is connected in a compact manner with a board which supports the electronic energizing and evaluation circuits. As a variant, it is within the scope of the invention to

arrange an elongate transmitting electrode in parallel to a array of a plurality receiving electrodes arranged in side by side relationship. In such a case, the receives signals are processed by a multiplexer. The additional electronic evaluation circuit corresponds to the one already described.

5           A further embodiment of the transmitting and receiving electrodes is characterized by the fact that a plurality of transmitting and receiving electrodes are arranged in side by side relationship and/or in a row. Energization as well as reception of the signals are processed by multiplexing and demultiplexing processes.

10           When used in manual devices, they will be analogously equipped with corresponding devices for transporting the document or the scanner and which are functionally similar to those of copy machines, optical image insertion scanners or telecopying machines. As a variant thereto, a device is provided which defines the position of capacitively operating scanners of the  
15           examining apparatus in accordance with the invention by means of abutments.

            For the target-oriented examination of a defined number of security elements of a document the apparatus is provided with a differing number of  
20           transmitting and receiving electrodes disposed in a side by side arrangement. The greater the resolution attained thereby, the more security elements and encryptions of a heightened degree of difficulty as regards counterfeiting may be examined. In this manner it is possible to manufacture simple manual devices, for instance for every-day use, in a simple, easily usable and cost-  
25           efficiently, by means of which the presence of security elements, for instance a simple safety thread, is examined. This is realized by a simple micro-processor software which is sensitized to certain security characteristics only and which is not public. An increased resolution with correspondingly structured software for the micro-controller makes it possible to examine all  
30           security characteristics. Such high examination complexity is used, for instance, by manufacturers of such security characteristics and by users of high security standards to yield the highest possible test results. In this



manner, different conductivities may also be recognized.

In accordance with the invention, it is within the scope of the invention to execute an image recognition and an examination of the document condition within the total system of the use of the described security elements and apparatus for the examination of documents. An image recognition is possible by way through coding by means of the electrically conductive security elements. The coding may be an automatic one or one which assists as an auxiliary means for sorting, a coding relating to the definition of nominations and a coding for defining the genuineness. In an automatic coding no further security element will be present, and the electrically conductive security element must be unambiguously identifiable by, for instance, its position on the document, so that the rate of erroneous rejections is reduced. In the case of an assisting auxiliary coding further characteristics are present; the coding then serves as a reference in case an erroneous rejection has been recognized. A condition control is performed by means of the examining apparatus in accordance with the invention in that the conductivity of a security element permits conclusions in respect of the condition of a document, because, empirically, a badly worn document results in a deterioration of its electrically conductive structures and, therefore, a change in its electrical conductivity. The individual degrees of wear are classified by means of software. Hence, documents of a predetermined degree of wear can be sorted out. This degree of wear is evidenced, for instance, by a partially damaged OVD, a torn document and a security element thus damaged reduced or an excessively crumpled document which may have caused a fracture within the security element. Hence, many-faceted possibilities of combinations result between examination for authenticity, image recognition and control of condition. Aside from an optical structuring of security characteristics on a document to be examined -as described above- the security elements in accordance with the invention will be provided with codes which are mathematically related -for instance for forming a sum- and which result in a main code which together with a signal or code from a simultaneously conducted examination for the genuineness of

a metallic safety strip and/or from a further simultaneously performed examination of the OVD determines the genuineness, the condition or the series of a predetermined document.

5           The characteristics of the invention are apparent not only from the claims but also from the specification and drawings, with individual characteristics constituting advantageous and patentable embodiments, either by themselves or, as sub-combinations, in connection with other embodiments, for which protection is sought hereby. Embodiments of the  
10 invention are depicted in the drawings and will be described in greater detail hereinafter.

In the drawings:

Fig. 1 is a schematic presentation of a document with a meandering metallized security characteristic;  
15 Fig. 2, 3 are schematic presentations of a document with a strip-shaped metallized security characteristics;  
Fig. 4 is a schematic presentation of a document with a grid-shaped metallized security characteristic;  
Fig. 5 is a schematic presentation of a document with several  
20 security characteristics;  
Fig. 6 is a block circuit diagram of an examining apparatus;  
Fig. 7 - 9 are schematic presentations of different scanners;  
Fig. 10 is a schematic presentation in side elevation of the scanner and a document to be examined;  
25 Fig. 11 is a schematic section of metallized security elements;  
Fig. 12 is a voltage - time diagram of the evaluation signal related to Fig. 11; and  
Fig. 13 - 15 are schematic presentations of scanners and a structured security characteristic.

30

Each of the examples shown in Fig. 1 to 5 shows a document with security elements in accordance with the invention, which contain a target-

oriented electric code. The code is not formed by encrypting any kind of data, but, rather, by the arrangement of electrically conductive structures relative to each other or in one another and separated by non-conductive structures, electrically conductive examination indicia are arranged in a target-oriented manner the electrical decoding of which by the examination apparatus of the invention results in a predetermined signal pattern which is compared to an already present stored signal pattern. This yields the desired high examining speed. [see description Fig. 14].

The capacitively operating scanner of the apparatus in accordance with the invention has also been schematically shown.

Fig. 1 depicts the schematic structure of a security element 1 with metallized layers 2. The metallized layers 2 are separated by an insulating zone 3. In top elevation, the insulating zone is shaped like a meander. The width of the insulating zone 3 shaped like a meander is larger than the smallest distance between two electrodes. The capacitively operating scanner 4 consists of a plurality of transmitting electrodes disposed in side by side relationship and a receiving antenna 6 disposed in parallel to this array. Fig. 2 depicts the schematic structure of a security element 1, in which strip-shaped metallized zones 7 and insulating strip-shaped zones 8 are alternately arranged in parallel relationship. The zones 7, 8 which in top elevation are strip-shaped extend either parallel to, or vertically of, the direction of document transport. The latter case is depicted in Fig. 3. The distance between two zones of the same conductivity is between .2 mm and 1.0 mm. The widths of the zones of the same conductivity are varying. Zones of different conductivity and different widths are also possible.

Fig. 4 represents a combination of the characteristics of Fig. 2 and 3. Strip-shaped metallized zones 7 and insulating strip-shaped zones 8 are alternately arranged in parallel to the direction of document transport. The metallized zones 7 are interrupted by a strip-like insulating zone 9 extending vertically thereof.

Fig. 5 depicts a document with several security characteristics. The deliberate combination results in a further coding. This leads to increased

examination safety.

Fig. 6 to 9 present a block circuit diagram as well as different embodiments of the capacitively operating scanner 4.

Fig. 5 is a block circuit diagram of the examining apparatus in accordance with the invention, consisting of an electronic energizing circuit, a capacitively operating scanner 4 and an electronic evaluation circuit. The electronic energizing circuit essentially consists, in addition to a current source, of a demultiplexer 10, an oscillator 11 for providing energy for the transmitting electrodes and an oscillator 12 for energizing the demultiplexer.

The electronic evaluation circuit consists essentially of a current source, an amplifier 13, a demodulator 14, a comparator 15, a micro-processor 16 with a memory as well as filters for the suppression of extraneous and interference signals.

The transmitting and receiving electrodes are cast into a sensor support. They form a capacitively operating scanner 4 across the entire width of the document feed path. The strip-shaped receiving electrode extends normal to the document feed path. The transmitting electrodes are arranged in parallel to the receiving electrode. The distance between a transmission electrode and the receiving electrode is determined by the electrically conductive security elements typical of a document. Aligning several transmitting electrodes in a row results in the possibility along the longitudinal axis of the capacitively operating scanner 4 simultaneously to detect several electrically conductive characteristics. The resolution attainable in this arrangement depends upon the number of transmitting electrodes used. In the present embodiment the resolution at a scanable point per mm extends in the longitudinal as well as the transverse direction. The minimum distance between adjacent transmitting electrodes is limited by the interfering capacitive coupling among them. In order to prevent this and to reduce the interference of adjacent transmitting electrodes, the transmitting electrodes are energized sequentially by a multiplexer 10. Arranging the transmitting electrodes across the entire document feed path results in the documents being examined regardless of their disposition. Accordingly, there is no need

for pre-sorting several documents in a document processing machine.

Fig. 7 is a schematic presentation of the scanner 4 with a plurality of transmitting electrodes 5 and one receiving electrode 6. Energization and evaluation is carried out as in the block circuit diagram of Fig. 6.

5 Fig. 8 schematically presents an embodiment of the capacitively operating scanner 4 with one transmitting electrode 17 and a plurality of receiving electrodes 18. In contrast to the block circuit diagram of Fig. 6, the transmitting electrode 17 is energized by an oscillator. The signals at the receiving electrodes 18 are processed by means of a multiplexer. Additional  
10 electronic evaluation circuitry consisting of current source, an amplifier, a demodulator, a comparator, a micro-processor with a memory and filters for the suppression of extraneous and interference signals, is the same as in the block circuit diagram of Fig. 6.

Fig. 9 is a schematic presentation of a further embodiment of the  
15 capacitively operating scanner having a plurality of transmitting electrodes 19 and a plurality of receiving electrodes 20. They are alternately disposed in a row. Therefore, the energizing signals of the transmitting electrodes 19 as well as the evaluation signals at the receiving electrodes 20 are respectively processed by multiplexing and demultiplexing processes.

20 Fig. 10 is a schematic presentation in side elevation of the capacitively operating scanner 4 and a document to be examined. The security characteristic 1 contains metallized lines 21 as well as an electrically insulating support foil 22.

Fig. 11 is a schematic section through a security characteristic with a  
25 support layer 23 and a partially metallized layer 24. The partially metallized layer 24 contains several insulating segments 25. The partially metallized layer 26 is of an electrical conductivity different from the partially metallized layer 24. In the schematic presentation the edges of the partially metallized layers 24, 26 are depicted in an idealizing manner at a right angle to the  
30 surface of the support layer 23. Margins or edges of this kind cannot even approximatingly be fabricated by conventional chemical processes, such as etching, as they lead to "frayed" edges in the longitudinal direction as well as

angles varying between acute and obtuse with respect to the support layer 23. To obtain marked signal patterns the metallized layers 24, 26 must, by contrast, be provided with a steady longitudinal pattern and with edges which engage the support surface 23 at almost a right angle. Electro-chemical or  
5 electro-corrosive demetallizing processes are particularly suited for this purpose. The related evaluation signal is shown as a voltage - time diagram in Fig. 12.

Fig. 13 to 15 are schematic presentations of scanners 33, 34, 35 and a structured security characteristic 36. The structure of the security  
10 characteristic 36 consists of an annular metallized security element 37, a strip-like metallized security element 38 and two rectangularly metallized security elements 39, 40. The examination safety is attained through the noticeably high steepness of the edge of the metallizations, as it significantly increases the difficulties of forgery. Simple manual apparatus contain a  
15 scanner 33 in accordance with Fig. 13. The resolution is so low that the strip-like security element 38 only may be detected. Such manual apparatus are ideally suited for every day use, for they are simple, easily handled and producible in a cost-efficient manner.

Apparatus of higher resolution as in Fig. 14 contain a scanner 34 and  
20 in addition to the strip-like security elements, they permit examination of additional security elements such as, in this case, an annular security element 37. The rectangular security elements 39, 40 are not examined. This is accomplished by simple soft-ware technology sensitized to certain security elements only. The rectangular security elements 39, 40 are not stored in  
25 memory as reference signal images.

Fig. 15 depicts a higher resolution with correspondingly structured software for the micro-controller. It makes it possible to examine all security elements, i.e. even the rectangular security elements 39, 40. To maintain the brilliancy of the optically effective security elements the micro-structures are  
30 fabricated by target-oriented metallization. This result in steep edges relative to non-metallized structures.

To accomplish the task of the invention, i.e. to propose a novel method

for use of security elements and examination apparatus to counteract the awareness or the quick publicizing of the function of examination methods and apparatus, the following use of security elements will be explained in connection with the corresponding use of the method and apparatus in  
5 accordance with the invention.

Broad use of the invention requires the definition of groups of examiners to whom is imparted certain knowledge of an examination system and who perform, by means of prescribed examination technology, examination as regards authenticity, but also image recognition and an  
10 examination of the condition.

The use of the examination system will be explained on the basis of groups A, B and C.

#### Group A:

15 It is well-known that government banks publish security characteristics of banknotes to enable a user to perform an examination under a guideline. Such publications relate to methods of examination which are performed with aids and methods performed with aids. The scanning sensor is incorporated in a manual apparatus. A examination of the electrical conductivity is  
20 performed of certain security elements by this manual apparatus and special software.

The software is modified so as to activate the scanner when moving the banknote across optical scanners, and the run-through length is measured subsequently. The electrical conductivity of a security element  
25 must be present at a set value. The end of the banknote is determined by optical sensors and the scanning sensor is deactivated. In this manner, the position of an electrically conductive security element on the test object may established. The data are compared with stored data and evaluated by a controller.

30

#### Group B:

Group B possesses machines for processing banknotes. These machines

are equipped with special sensors for detecting different characteristics. At present, such machines are equipped with sensors for the optical range and/or for detecting magnetic properties and/or for examining the run-through length by means of a capacitive sensor. With these sensors it is possible to  
5 detect the presence of electrically conductive characteristics larger than 6 mm. They do not permit detection of electrically conductive security elements in the run-through width. Also, detection of differing electrical conductivity in the security elements is not possible. Structures within a security element can also not be detected. However, the described examinations are possible  
10 with the scanner so that Group B may perform an examination of higher value.

The software in Group B is structured so as to activate the scanning sensor by the optical sensors and thereafter to recognize the annular metallized security characteristic 37 and the strip-like metallized security  
15 characteristic 38. The value of the conductivity is pre-set. Deviations above and below 30% are rejected.

#### Group C:

The software is structured so as to recognize all security elements.  
20 The scanning sensor is activated by means of optical sensors. Run-through length and run-through width of security characteristic 36, the annular metallized security element 37, the strip-like security element 38 and the rectangular security elements 39, 40 are recognized. The electrical conductivity is pre-set, and deviations above or below 30% are rejected.

25 The entire examination system may be varied in particular in Groups A and B, and in respect of examining the Euro its defined tasks may be nationally changed. Since the security characteristic to be examined in the Euro, for instance, is the same for all states, the method of examination as well as the examination apparatus may be modified and changed in a timed  
30 sequence for national purposes depending upon points of emphasis.

The use of the security elements and examination apparatus as described above, is applied as follows: An image recognition may take place



by means of encode target-oriented metallizations. The image recognition may be used for different purposes such as, in particular, purposes of sorting, defining nominations or genuineness. A further advantage of the method of examination resides in the control of the condition. Conclusions may be  
5 drawn as to the condition of banknote paper by measuring the electrical conductivity. Badly worn paper will strongly reduce the electric conductivity.

The structure of security elements and an apparatus for examining such elements has been described in the context of the present invention on  
10 the basis of concrete embodiments. It is to be noted, however, that the invention is not limited by details of embodiments described in the specification, as changes and alterations are claims within the scope of the claims. The deliberate combination of optically effective diffraction security elements with other electrically conductive means results in a further coding.  
15 At the same time, further electrically conductive characteristics such as, for example, an electrically conductive security thread, may be classified by the examination apparatus in accordance with the invention.

20

25

30

Patent Claims:

- 09485750.024400
1. Structure of optically effective diffraction security elements with a metallic reflection layer, **characterized by** a target-oriented electric code of data by additionally applied [page 8, lines 7-10] beam, grid, bow and/or circularly shaped electrically conductive structures with steep edges towards adjacent non-metallized structures in different planes [DE 197 34 855], the line thickness of the smallest electrically conductive structure which may be examined being less than or equal to 5 mm.
  2. Structure of security elements of claim 1, allow examination of security elements, **characterized by** a target-oriented electric code of data by additionally applied [page 8, line 7-10] beam, grid, bow and/or circularly shaped metallized structures with steep edges towards adjacent non-metallized structures in different planes [DE 197 34 855], the line width of the smallest metallized structure which may be examined being less than or equal to 5 mm.
  3. Structure of security elements of one or more of the preceding claims, **characterized by the fact** that different electrically conductive structures [claim 1] possess different electric conductivities.
  4. Structure of security elements of one or more of the preceding claims, **characterized by the fact** that at least two structures within a security element possess different application thicknesses [claim 1].
  5. Structure of security elements of one or more of the preceding claims, **characterized by the fact** that the width of an electrically conductive layer of constant electric conductivity corresponds to the width of at least two electrodes of an examination apparatus.

6. Structure of security elements of one or more of the preceding claims, **characterized by the fact** that the distance between two electrically conductive structures of the same and/or different electric conductivity is at least .1 mm.
- 5
7. Structure of security elements of one or more of the preceding claims, **characterized by the fact** that the additionally applied electrically conductive structures are inks or dyes [page 6, lines 14-22].
- 10
8. Apparatus for the capacitive examination of documents with optically effective diffraction security elements with a metallic reflection layer, **characterized by the fact** that a capacitively operating scanner (4, 33-35) the width of which is larger than the largest width of a document [DE 197 34 855] examines electrically conductive structures [claim 1] arranged within metallized security elements (37) by means of a plurality of transmitting electrodes (5) arranged in one or more rows in side by side relationship and with a receiving electrode (6) extending along the transmitting electrodes (5) on the same side as the document to be examined [see description of Fig. 1 as well as Fig. 1-10, 13-15] and evaluates them by electronic energizing and evaluation circuits arranged in the scanner (4, 33-35) for comparing the signal pattern of the document to be examined with corresponding reference signal patterns.
- 15
- 20
- 25
9. Apparatus of claim 8, **characterized by the fact** that at least two adjacent electrodes are arranged electrically connected.
10. Apparatus of claim 8 or 9, **characterized by the fact** that electronic energizing circuit consists of a current source, a multiplexer (10), an oscillator (11) for providing energy for the transmitting electrodes (5) and an oscillator (12) for energizing the multiplexer (10).
- 30

11. Apparatus of one or more of claims 8 to 10, **characterized by the fact** that the electronic evaluation circuit consists of a current source, an amplifier (13), a demodulator (14), a comparator (15), a micro-processor (16) with memory as well as filters for the suppression of extraneous and interference signals.
12. Apparatus of one or more of claims 8 to 11, **characterized by the fact** that the smallest distance between two transmitting electrodes (5) is smaller than .5 mm.
13. Apparatus of one or more of claims 8 to 12, **characterized by the fact** that the distance between a transmitting electrode (5) and the receiving electrode (6) is at least .5 mm.
14. Apparatus of one or more of the preceding claims 8 to 13, **characterized by the fact** that the apparatus is provided with a biasing device which guides the document to be examined parallel to the transmitting and receiving electrodes, preferably biases against the scanner.
15. Apparatus of one or more of the preceding claims 8 to 14, **characterized by the fact** that the shafts of the document transport rollers are connected to mass by sliding contacts.
16. Apparatus of one or more of claims 8 to 14, **characterized by the fact** that the apparatus is arranged in high speed document processing machines.
17. Apparatus of one or more of claims 8 to 16, **characterized by the fact** that the apparatus is arranged in manual apparatus.

18. Apparatus for use of optically effective diffraction security elements with a metallic reflection layer in documents with a structure according to one or more of claims 1 to 7, as well as use of an apparatus according to one of more of claims 8 to 17, **characterized by the fact**
- 5 that electrically conductive structures are arranged in such a manner in respect of size, shape, number, hue and spacing among each other on a document to be examined
- that at least one of the electrically conductive structures may be recognized by a group A of persons with the scanner (33) structured as

10 a hand-held apparatus;

  - that at least two of the electrically conductive structures may be recognized by a smaller group B of persons with a scanner (34) installed in a high speed processing machine and equipped with software which is different from the software provided for the group A

15 of persons;

  - that at least three of the electrically conductive structures may be recognized by a very small defined group C of persons with a scanner (34) installed in a high speed processing machine (35) and equipped with software which is different from the software provided for the

20 groups A and B of persons, and

  - that the electrically conductive structures constitute codes which are visually perceptible to persons of group A, and to persons of group B visually and by decoding by software, and to persons of group C primarily by software not available to persons of groups A and B.
- 25
- 30

Translation from German

**Wolfgang Heitsch**    **Patent Attorney**    Göhlsdorfer Straße 25g    14778 Jeserig

**Summary**

This invention relates to the structure of safety elements for documents and devices for the testing of test documents including said safety elements as well as procedures for the application of said safety elements and devices according to patent application DE 197 34 855.6. It is the object of this invention to complete the structure of safety elements for documents by additional safety elements and to contemplate devices for the testing of said safety elements as well as a new application procedure of safety elements and devices which will make it very difficult, if not even impossible, for the counterfeiter to draw any conclusions from the functioning of the test procedures and devices to the safety elements to be tested and, thus, to produce counterfeits that are so similar to the originals that they are not detected by the test devices. The structure of the safety elements for documents to be tested provides a new design not primarily based on a visual examination but on test procedures. This design – hereinafter called functional design – is the combination of electrically conductive and isolating structures having the same or a different size, at the same or different levels to each other, with the same or different conductivities, and it is made of metallized structures and/or conductive inks or printing inks.

09485750-021400

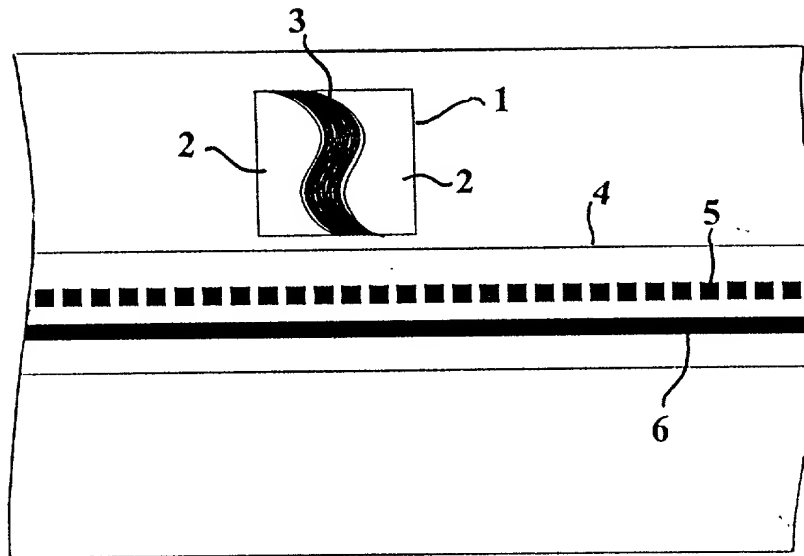


Fig. 1

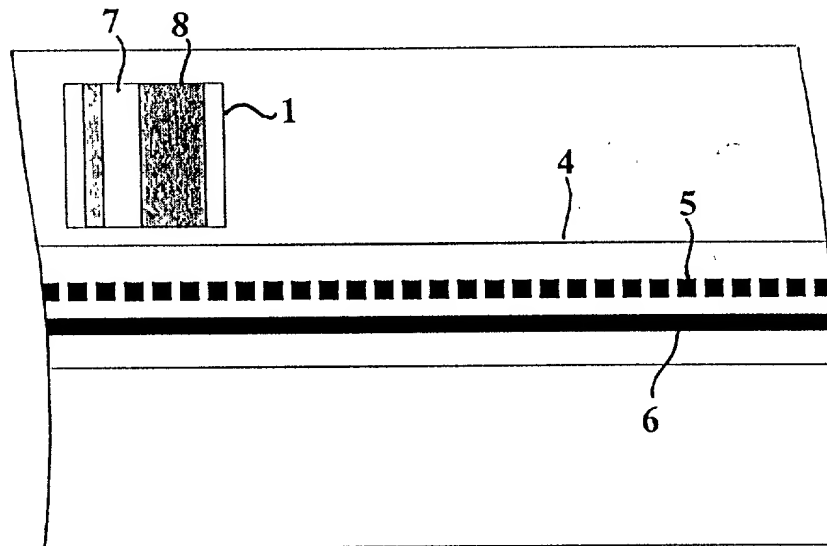


Fig. 2

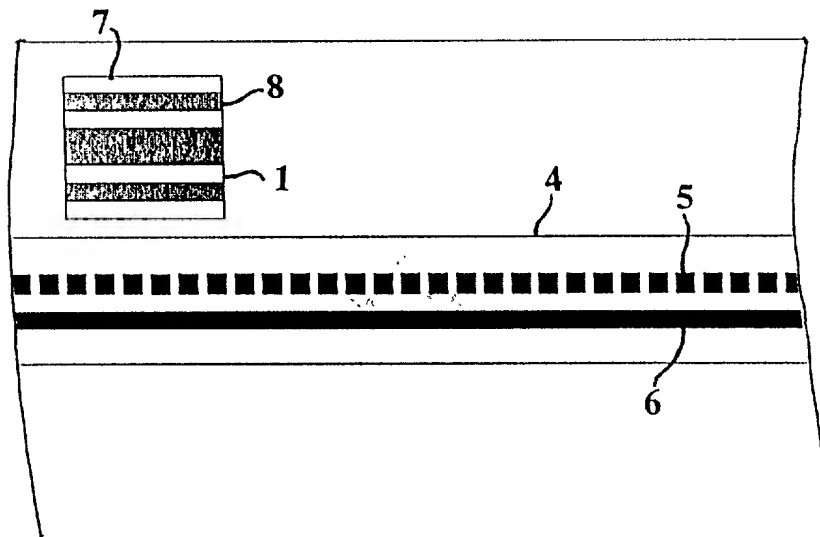


Fig. 3

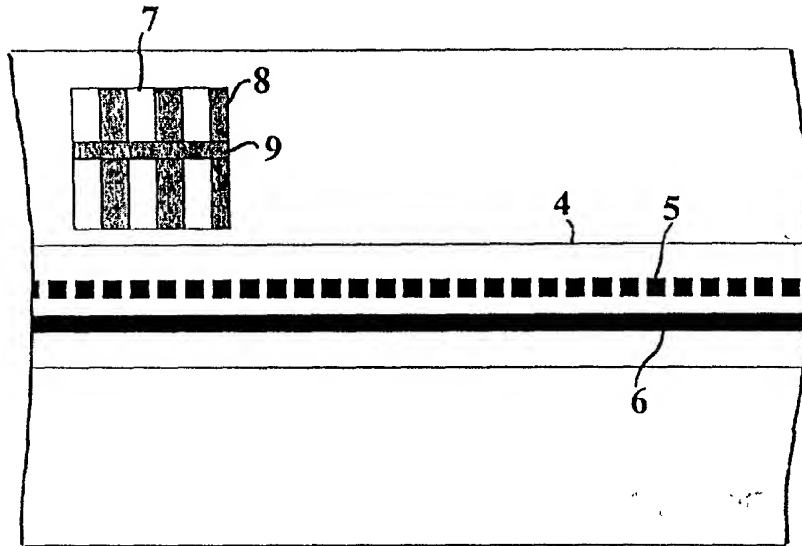


Fig. 4

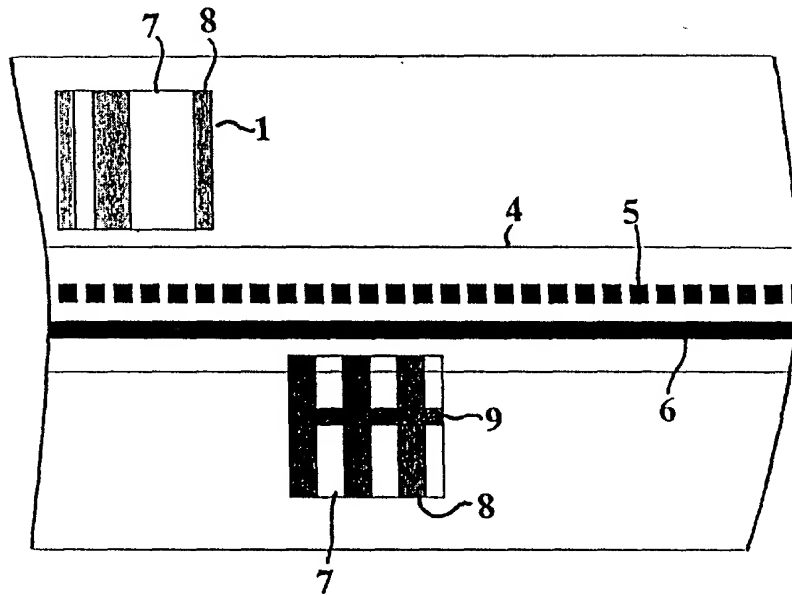


Fig. 5



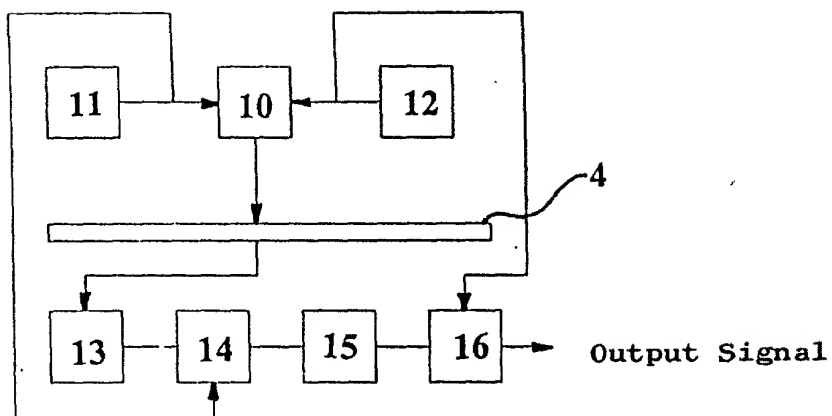


Fig. 6

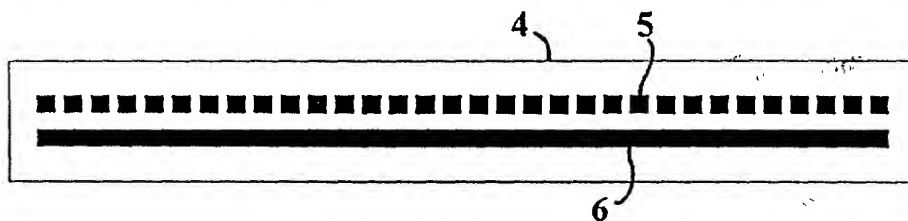


Fig. 7

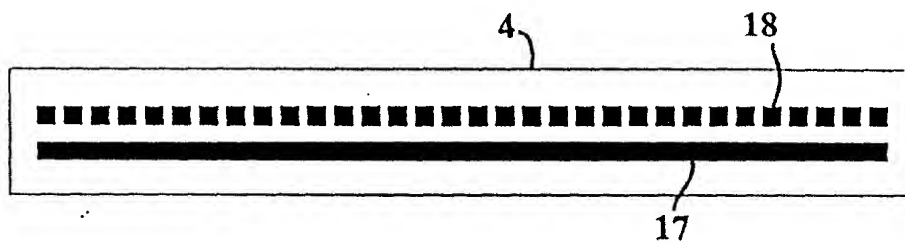


Fig. 8

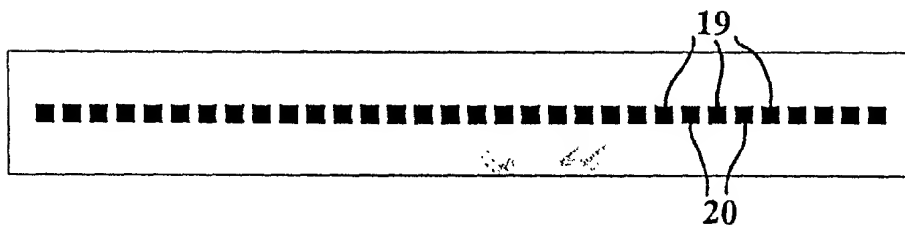


Fig. 9

4/5

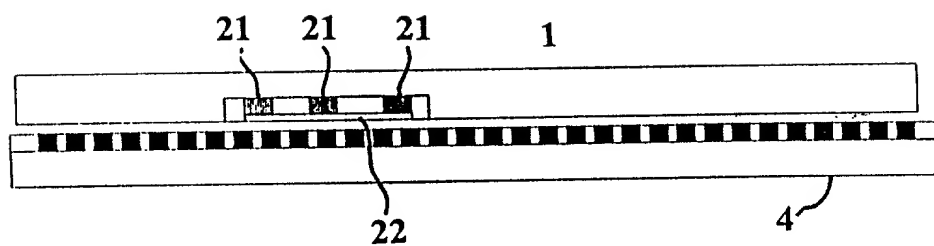


Fig. 10

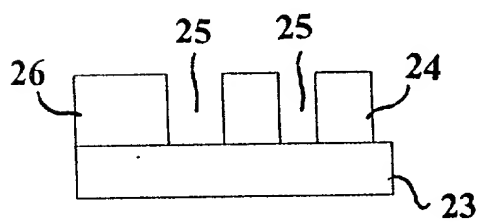


Fig. 11

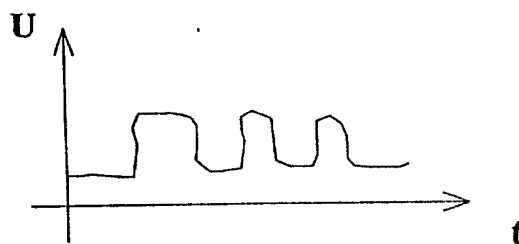


Fig. 12

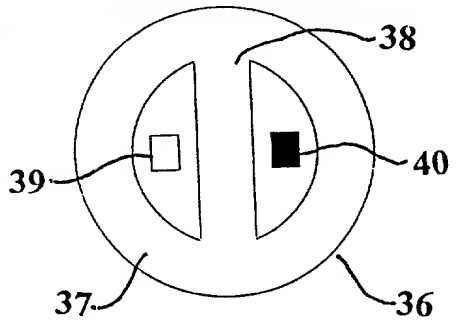
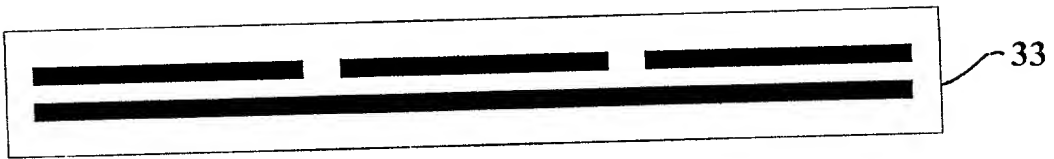


Fig. 13

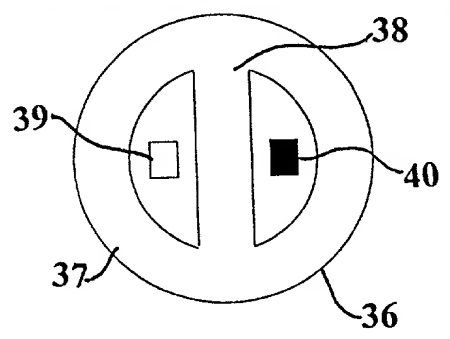
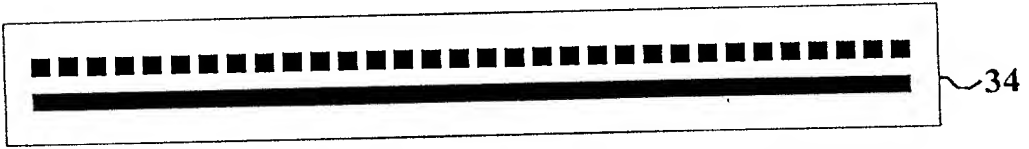


Fig. 14

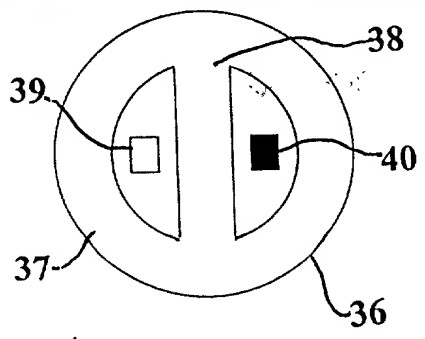
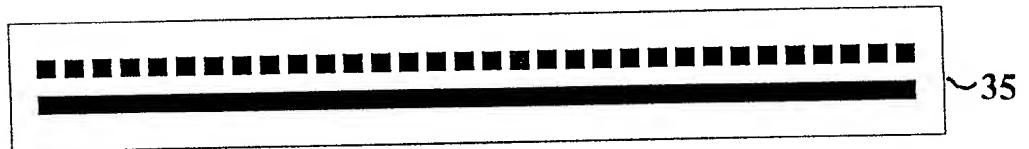


Fig. 15

004720" 09258460

Docket No.  
990351

1.160. US/CA

# Declaration and Power of Attorney For Patent Application

## English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**Security Element Structure for Documents, Devices for Controlling Documents Comprising such Security Elements, and Method of Using said Security Elements and Devices**

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on \_\_\_\_\_ as United States Application No. or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.58.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

197 34 855.6 \_\_\_\_\_  
(Number)  
198 12 811.8 \_\_\_\_\_  
(Number)  
\_\_\_\_\_  
(Number)

Germany \_\_\_\_\_  
(Country)  
Germany \_\_\_\_\_  
(Country)  
\_\_\_\_\_  
(Country)

12 August 1997 \_\_\_\_\_  
(Day/Month/Year Filed)  
16 March 1998 \_\_\_\_\_  
(Day/Month/Year Filed)  
\_\_\_\_\_  
(Day/Month/Year Filed)

☐  
☐  
☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional

N/A

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PCT/DE98/01180

(Application Serial No.)

24 April 1998

(Filing Date)

Pending

(Status)  
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)  
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)  
(patented, pending, abandoned)

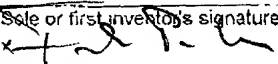
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY. As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Karl Hormann, Esq., Registration No.: 26,470

Send Correspondence to: Law Offices of Karl Hormann  
86 Sparks Street  
Cambridge, MA 02138-2216

Direct Telephone Calls to. *(name and telephone number)*  
Mr Hormann @ (617)-491-8867

Full name of sole or first inventor	
<b>PUTTKAMMER, Frank</b>	
Sole or first inventor's signature	Date
	<b>10.02.2000</b>
Residence	<b>10 February 2000</b>
<b>Kastanienstrasse 19, D-01640 Coswig, Germany</b> <i>DEX</i>	
Citizenship	
<b>German</b>	
Post Office Address	
<b>same as residence</b>	

Full name of second inventor, if any	
Second inventor's signature	Date
Residence	
Citizenship	
Post Office Address	